

Hardware User's Manual

5-9 Holes box

Operant conditioning



References:

LE507(76-0001), LE509(76-0000)

Version:

V23/10/2014

Limitation of Liability








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Some symbols may have more than one interpretation by professionals unaccustomed to their usage.

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1. SYMBOLS TABLE

Recognising the symbols used in the manual will help to understand their meaning:

DESCRIPTION	SYMBOL
Warning about operations that must not be done because they can damage the equipment	
Warning about operations that must be done, otherwise the user can be exposed to a hazard.	
Protection terminal ground connection.	
Warning about a hot surface which temperature may exceed 65°C	
Warning about a metal surface that can supply electrical shock when it's touched.	
Decontamination of equipments prior to disposal at the end of their operative life	
Waste Electrical and Electronic Equipment Directive (WEEE)	

2. GOOD LABORATORY PRACTICE

Check all units periodically and after periods of storage to ensure they are still fit for purpose. Investigate all failures which may indicate a need for service or repair.

Good laboratory practice recommends that the unit be periodically serviced to ensure the unit is suitable for purpose. You must follow preventive maintenance instructions. In case equipment has to be serviced you can arrange this through your distributor. Prior to Inspection, Servicing, Repair or Return of Laboratory Equipment the unit must be cleaned and decontaminated.



Decontamination prior to equipment disposal

In use this product may have been in contact with bio hazardous materials and might therefore carry infectious material. Before disposal the unit and accessories should all be thoroughly decontaminated according to your local environmental safety laws.

3. UNPACKING AND EQUIPMENT INSTALATION



WARNING: Failure to follow the instructions in this section may cause equipment faults or injury to the user.


- A. No special equipment is required for lifting but you should consult your local regulations for safe handling and lifting of the equipment.
- B. Inspect the instrument for any signs of damage caused during transit. If any damage is discovered, do not use the instrument and report the problem to your supplier.
- C. Ensure all transport locks are removed before use. The original packing has been especially designed to protect the instrument during transportation. It is therefore recommended to keep the original carton with its foam parts and accessories box for re-use in case of future shipments. Warranty claims are void if improper packing results in damage during transport.
- D. Place the equipment on a flat surface and leave at least 10 cm of free space between the rear panel of the device and the wall. Never place the equipment in zones with vibration or direct sunlight.
- E. Once the equipment is installed in the final place, the main power switch must be easily accessible.
- F. Only use power cords that have been supplied with the equipment. In case that you have to replace them, the spare ones must have the same specs that the original ones.



- G. Make sure that the AC voltage in the electrical network is the same as the voltage selected in the equipment. **Never connect the equipment to a power outlet with voltage outside these limits.**



WARNING

For electrical safety reasons you only can connect equipment to power outlets provided with earth connections .

This equipment can be used in installations with category II over-voltage according to the General Safety Rules.

The manufacturer accepts no responsibility for improper use of the equipment or the consequences of use other than that for which it has been designed.

PC Control

Some of these instruments are designed to be controlled from a PC. To preserve the integrity of the equipment it is essential that the attached PC itself conforms to basic safety and EMC standards and is set up in accordance with the manufacturers' instructions. If in doubt consult the information that came with your PC. In common with all computer operation the following safety precautions are advised.



- WARNING**
- To reduce the chance of eye strain, set up the PC display with the correct viewing position, free from glare and with appropriate brightness and contrast settings
 - To reduce the chance of physical strain, set up the PC display, keyboard and mouse with correct ergonomic positioning, according to your local safety guidelines.

4. MAINTENANCE



WARNING: Failure to follow the instructions in this section may cause equipment fault.

- **PRESS KEYS SOFTLY** – Lightly pressing the keys is sufficient to activate them.
- Equipments do not require being disinfected, but cleaned for removing urine, faeces and odour. To do so, we recommend using a wet cloth or paper with soap (which has no strong odour). **NEVER USE ABRASIVE PRODUCTS OR DISSOLVENTS.**
- **NEVER** pour water or liquids on the equipment.
- Once you have finished using the equipment turn it off with the main switch. Clean and check the equipment so that it is in optimal condition for its next use.
- The user is only authorised to replace fuses with the specified type when necessary.

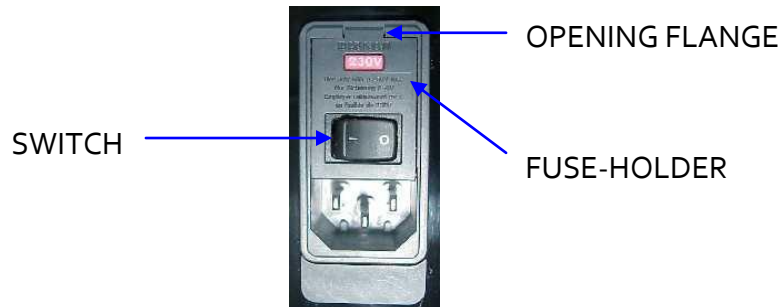


Figure 1. Power inlet, main switch and fuse holder.

FUSE REPLACEMENT

In case of an over-voltage or other incident in the AC net making it impossible to turn on the equipment, check fuses according to the following procedure.

- 1 Remove power cord from the power inlet

- 2 Open fuse-holder by pulling the flange with a regular screwdriver



Figure 2. Open fuse-holder door.

- 3 Extract fuse holder using the screwdriver.



Figure 3. Extract fuse-holder.

- 4 Replace fuses if necessary. Insert fuses in the fuse-holder in the correct position.



CORRECT



INCORRECT

Figure 4. Fuses position.

- 5 Insert again fuse-holder, both possible positions are correct because power supply is universal.
- 6 If the fuses blow again unplug the equipment and contact technical service.



For electrical safety, never open the equipment. The power supply has dangerous voltages.

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6. INTRODUCTION

The nine-hole box is commonly used to evaluate attention performance in laboratory animals through a visual discrimination task.

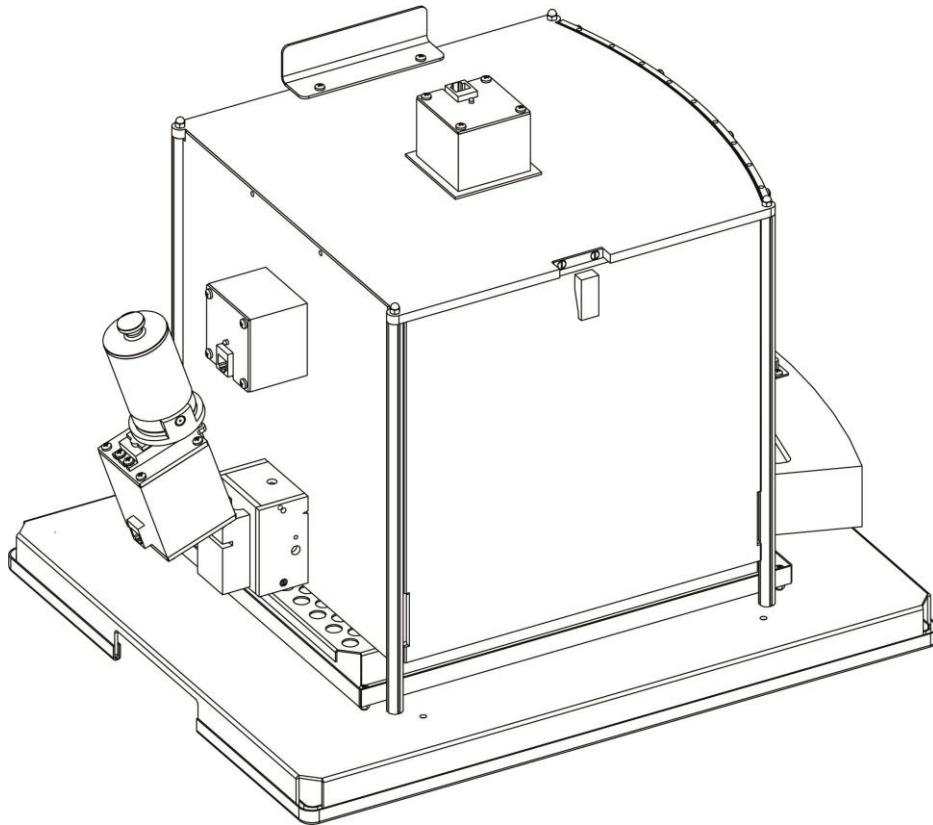


Figure 5. Nine-holes box schematic.

The box is equipped with an arc of 9 contiguous apertures set into the rear wall, a house light, a food pellet dispenser and a magnetic detector to detect nose-pokes into the food holder. The holes not used in the experiment can be separately occluded using a metal insert. Each hole is equipped with photocell beams and a LED at the rear of the hole, providing visual cues specific to each hole.

Different experimental paradigms can be conducted using the nine-hole box. For example, in the 5-choice serial reaction time task, short-lasting stimuli are given in pseudo-randomized order in one of the holes of the cage (commonly, holes 1, 3, 5, 7 or 9). If the animal nose-pokes into the correct hole, it is given a reinforcement (pellet). If the animal nose-pokes into an incorrect hole, it is given a time-out period (no light) and the next trial begins. The choice accuracy (% of correct responses) gives an idea of the functional integrity of the attention as well as learning processes. These parameters are usually altered in animal models of schizophrenia and Alzheimer's disease.

There are 2 cages LE507 is for mice and LE509 is for rats.

7. EQUIPMENT DESCRIPTION

7.1. CONTROL UNIT FRONT PANEL

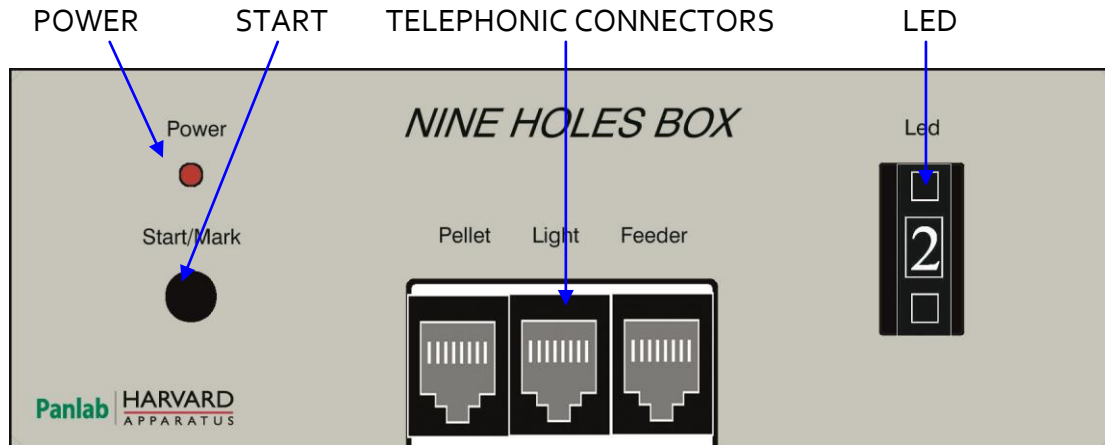


Figure 6. Control Unit Front Panel.

- **POWER:** Red led that indicates that the control unit is ON.
- **START:** This button can be used to start the experiment (if the program requires it). The start button can also be used as a marker during the program.
- **TELEPHONIC CONNECTORS:** There are 3 telephonic connectors.
 - **PELLETS:** Used to connect the pellets dispenser.
 - **LIGHT:** Used to connect the light on the top of the box.
 - **FEEDER:** Used to connect the magnetic detector (to detect when the animal introduces its head to eat a pellet).
- **LED:** With this digital selector that goes from 1 to 9 it is possible to adjust the intensity of the light in the 9 holes (1 is the minimum and 9 is the maximum).

7.2. CONTROL UNIT REAR PANEL

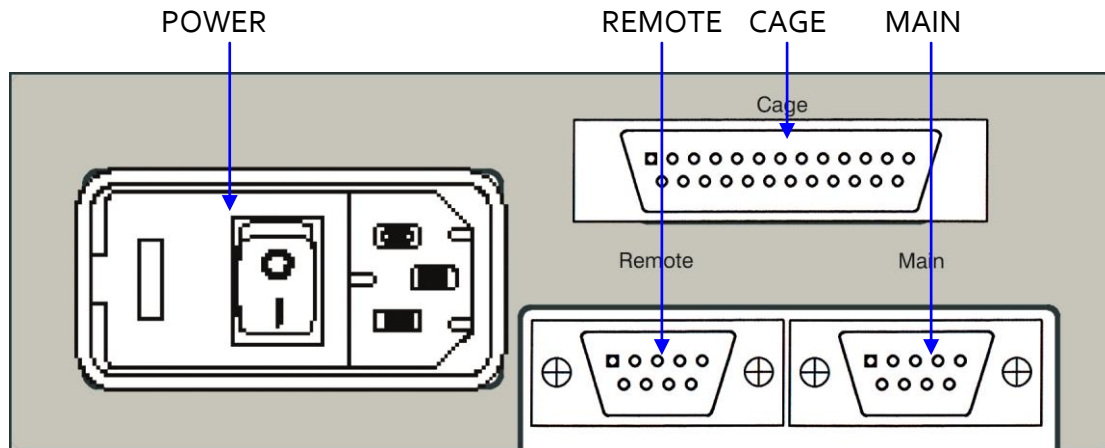


Figure 7. Control Unit Rear Panel.

- **POWER:** Power connector, main switch and fuse holder.
- **CAGE:** DB25 connector used to connect the control unit with the 9 holes.
- **MAIN:** DB9 female connector used to connect the control unit to the computer serial port, if the control unit is the first one. Alternatively, it is used to connect the control unit to the REMOTE port of the previous control unit, if the unit is not the first one.
- **REMOTE:** DB9 male connector used to connect the control unit to the MAIN port of the next control unit. If the control unit is the last one this port is kept free.

7.3. NINE-HOLES BOX

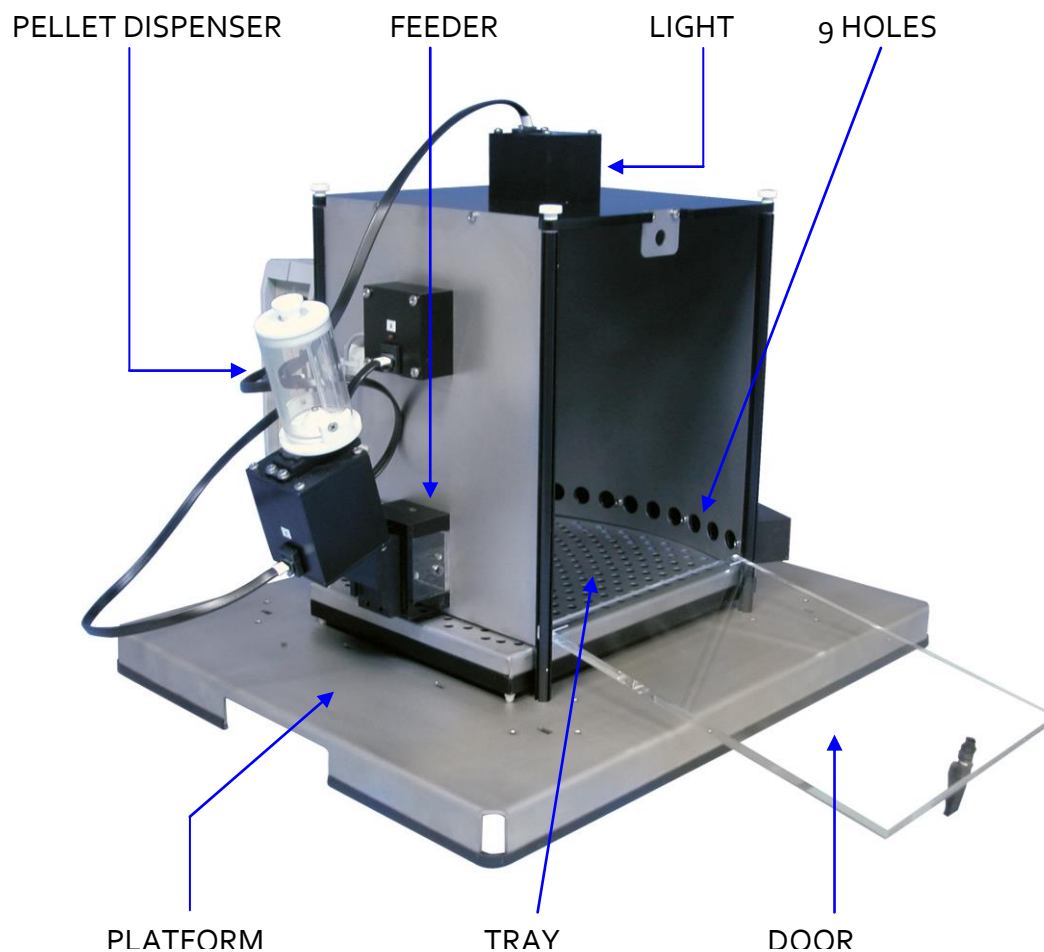


Figure 8. Nine-hole Box.

- **PELLET DISPENSER:** Supplies pellets to the animal as reinforcement.
- **FEEDER:** Detects when the animal introduces its head to eat a pellet.
- **LIGHT:** This light is placed on the top of the box. It is used as stimulus.
- **PLATFORM:** The box is placed on a stainless steel platform.
- **TRAY:** The tray is easily removable to clean animal excrements.
- **9 HOLES:** There are 9 holes. Each hole has the following components:
 - **LIGHT:** The intensity of the light can be adjusted in the control unit using the digital selector labelled **LED**.
 - **INFRARED EMITER:** Emits an infrared beam, when the animal introduces its head into the hole the beam is cut and the system detects that the animal has introduced its head into the hole.

- **INFRARED DETECTOR:** Detects the infrared beam, when an animal cuts the beam the system detects that the animal introduces its head into the hole.

8. EQUIPMENT CONNECTIONS

The LE507 - LE509 module is controlled by the **PackWin** computer program, through a serial port and the RS-232 protocol.

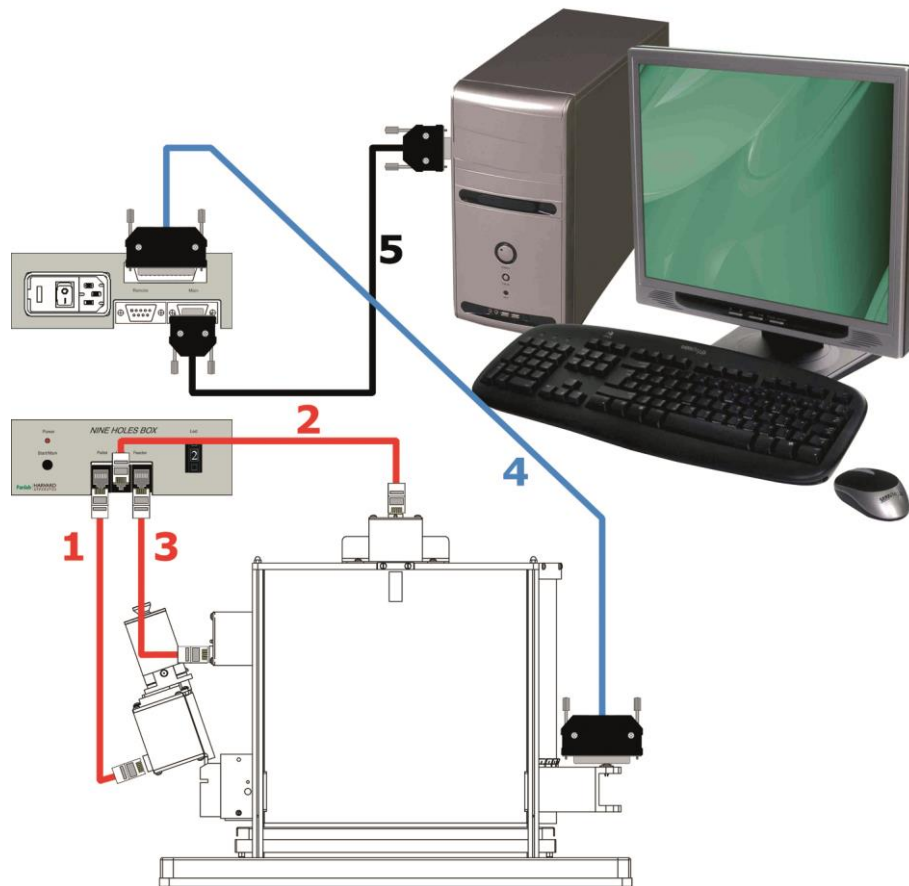


Figure 9. Connection between module and computer with 1 cage system.

The connections necessary for a one-cage system connection are listed in the following table:

	FROM	TO	CABLE
1	Pellets Dispenser	Control Unit 1	Telephonic cable 1
2	Light	Control Unit 2	Telephonic cable 2
3	Pusher	Control unit 3	Telephonic cable 3
4	9 holes	CAGE connector	DELTA 25 cable
5	PC serial port	MAIN connector	RS232 cable

A computer is able to control up to 10 modules at the same time, connecting them in a chain using the MAIN and REMOTE connections.



Figure 10. Example of connection of 3 cages.

Certain rules must be followed when connecting several modules in a series.

- All control units must have a different ID number. There is a decimal selector inside the control unit that allows selecting values between 0 and 9.
- The MAIN connector of the first control unit is connected to the computer serial port.
- The MAIN connector of each control unit is connected to the REMOTE port of the previous control unit.
- The REMOTE port of each control unit is connected to the MAIN port of the next control unit.
- The REMOTE port of the last control unit is left free.
- When several modules are connected in a chain, it is not necessary to connect them in the physical order of their identification numbers.



WARNING: Do not confuse intensity light selector labelled LED with the ID selector that is hidden inside the box of the control unit. In order to change the ID number in the control unit of the cage you must unscrew the 4 screws on the four legs. Before opening control unit you must turn it off and unplug it from the mains.

9. WORKING WITH THE EQUIPMENT

9.1. CONDUCTING A EXPERIMENT

1. Connect the equipment as explained in chapter 8.
2. If you will work with several cages at the same time you must set the ID numbers of all control units so that they are different. (See **WARNING** at the end of chapter 8).
3. Turn all control units on.
4. Turn on the PC.
5. Once the PC is booted, run the program **PackWin**.
6. Open a new protocol or edit an existing one in **PackWin**. (Read the user manual of this program for more information).
7. Place the subject in the experimental cage.
8. Begin the experiment.
9. Once the experiment is finished remove the subject from the experimental cage.
10. Turn off all control units and the PC.
11. Clean the cage to left it in good conditions for the next experiment.

9.2. CLEANING THE CAGE

9.2.1. CLEANING THE FLOOR AND TRAY

The floor of the cage is made of metal with holes so that faeces and urine fall into the tray. The tray contains the metal floor and collects faeces and urine.

The set formed by floor and tray can be removed from the cage to be cleaned. Once removed from the cage for cleaning you can use soap and water, then dry them well before replacing them back into the cage.

9.3. WALLS CLEANING

To clean the walls you can use a slightly wet cloth and then dry them with a dry cloth. If they're too dirty you can wet the cloth with a soapy solution to clean them, then remove the foam with a wet cloth and finally dry them with a dry cloth.

9.4. TRNASPARENT DOOR CLEANING



WARNING: In order to clean transparent door never use neither alcohol nor alcoholic derived products, otherwise stripes will appear in the transparent plastic.

To clean the door you can use a lightly wet cloth and then dry it with a dry cloth. If it's too dirty you can wet the cloth with a soapy solution, then remove foam with a wet cloth and finally dry it with a dry cloth.

10. TROUBLESHOOTING

This table features instructions to solve the most frequent problems.

PROBLEM	SOLUTION
The equipment does not start up.	<ul style="list-style-type: none"> Check the condition of the fuses.
The equipment is not identified by the program PackWin .	<ul style="list-style-type: none"> Check that the RS232 cable is connected between the control unit and the serial port of the PC (see Figure 9). When working with several control units connected in series, check the connections MAIN-REMOTE (see Figure 10) If you work with several control units all of them must be turned on in order not to cut MAIN -REMOTE communications. If you work with multiple control units, all ID numbers must be different so that the PC is able to differentiate them. If you use a USB to RS-232 check for proper setup on the PC.
The pellets dispenser does not work.	<ul style="list-style-type: none"> Check that the phone cord that connects the control unit to the pellets dispenser is plugged into the correct port labelled "Pellet" (see Figure 9).
The light of the cage does not work.	<ul style="list-style-type: none"> Check that the phone cord that connects the control unit with the light is connected in the correct port labelled "Light" (see Figure 9).
The door of the feeder, does not detect when the animal enters the head to eat.	<ul style="list-style-type: none"> Check that the phone cord that connects the control unit with the door of the feeder is connected to the correct port labelled "Feeder" (see Figure 9).
The equipment does not detect when the animal enters the nose in one of the holes with light.	<ul style="list-style-type: none"> Check that the DB25 flat cable is connected between the control unit and the experimental cage (see Figure 9).
The lights do not come on nine holes.	<ul style="list-style-type: none"> Check that the DB25 flat cable is connected between the control unit and the experimental cage (see Figure 9)

11. PREVENTIVE MAINTENANCE

	EXPERIMENT	MONTHLY
FLOOR CLEANING	<input checked="" type="checkbox"/>	
TRAY CLEANING	<input checked="" type="checkbox"/>	
TRANSPARENT DOOR CLEANING		<input checked="" type="checkbox"/>
WALLS CLEANING		<input checked="" type="checkbox"/>
CHECK FLOOR AND TRAY PLACING	<input checked="" type="checkbox"/>	

12. SPECIFICATIONS

POWER SUPPLY Input voltage: Frequency: Fuse: Maximum power: Conducted noise:	Universal 100-240V ~ 50/60 Hz 2 fuses 5mm*20mm 2A 250V Fast 30W EN55022 /CISPR22/CISPR16 class B
ENVIRONMENTAL CONDITIONS Operating temperature: Operating relative humidity: Storage temperature:	10°C to +40°C 0% to 85% RH, non-condensing 0°C to +50°C, non-condensing
FRONT PANEL PORTS Connector Ports: LIGHT PELLETS FEEDER	RJ12
BULB Voltage: Power:	24V 0,1W
COMUNICATIONS OUTPUT Standard interface: Connector:	RS232C Delta 9-contact connector
DIMENSIONS (control unit) Width x Height x Depth: Weight:	150 mm*66 mm*250 mm 1.41 kg
DIMENSIONS (cage LE 507) Width x Height x Depth: Weight:	442 mm*350 mm*365 mm 6,43kg
DIMENSIONS (cage LE 509) Width x Height x Depth: Weight:	442 mm*350 mm*365 mm 7,36kg

**DECLARACIÓN DE CONFORMIDAD
DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITÉ**

Nombre del fabricante: **Panlab s.l.u.**
Manufacturer's name: www.panlab.com
Nom du fabricant: info@panlab.com

Dirección del fabricante: **Energía, 112**
Manufacturer's address: **08940 Cornellà de Llobregat**
Adresse du fabricant: **Barcelona SPAIN**

Declara bajo su responsabilidad que el producto: **NINE HOLE BOX**
Declares under his responsibility that the product:
Déclare sous sa responsabilité que le produit:

Marca / Brand / Marque: **PANLAB**

Modelo / Model / Modèle: **LE 507 – LE 509**

Cumple los requisitos esenciales establecidos por la Unión Europea en las directivas siguientes:
Fulfills the essential requirements established by The European Union in the following directives:
Remplit les exigences essentielles établies pour l'Union Européenne selon les directives suivantes:

2006/95/EC	Directiva de baja tensión / Low Voltage / Basse tension
2004/108/EC	Directiva EMC / EMC Directive / Directive CEM
2012/19/EU	La Directiva de Residuos de Aparatos Eléctricos y Electrónicos (WEEE) / The Waste Electrical and Electronic Equipment Directive (WEEE) / Les déchets d'équipements électriques et électroniques (WEEE)
2011/65/EU	Restricción de ciertas Sustancias Peligrosas en aparatos eléctricos y electrónicos (ROHS) / Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (ROHS) / Restriction de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques (ROHS)
2006/42/EC	Directiva mecánica / Machinery directive / Directive mécanique

Para su evaluación se han aplicado las normas armonizadas siguientes:
For its evaluation, the following harmonized standards were applied:
Pour son évaluation, nous avons appliqué les normes harmonisées suivantes:

Seguridad / Safety / Sécurité:	EN61010-1:2010
EMC:	EN61326-1:2013 Class B
Safety of machinery:	EN ISO 12100:2010

En consecuencia, este producto puede incorporar el marcado CE:
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En representación del fabricante:
Manufacturer's representative:
En représentation du fabricant:

Carme Canalis
General Manager
Panlab s.l.u., a division of Harvard BioScience

Cornellà de Llobregat, Spain
25/06/2014

(GB) Note on environmental protection:



After the implementation of the European Directive 2002/96/EU in the national legal system, the following applies:

Electrical and electronic devices may not be disposed of with domestic waste. Consumers are obliged by law to return electrical and electronic devices at the end of their service lives to the public collecting points set up for this purpose or point of sale. Details to this are defined by the national law of the respective country. This symbol on the product, the instruction manual or the package indicates that a product is subject to these regulations. By recycling, reusing the materials or other forms of utilising old devices, you are making an important contribution to protecting our environment.

(E) Nota sobre la protección medioambiental:



Después de la puesta en marcha de la directiva Europea 2002/96/EU en el sistema legislativo nacional, Se aplicara lo siguiente:

Los aparatos eléctricos y electrónicos, así como pilas y baterías, no se deben tirar a la basura doméstica. El usuario está legalmente obligado a llevar los aparatos eléctricos y electrónicos, así como pilas y baterías, al final de su vida útil a los puntos de recogida municipales o devolverlos al lugar donde los adquirió. Los detalles quedaran definidos por la ley de cada país. El símbolo en el producto, en las instrucciones de uso o en el embalaje hace referencia a ello. Gracias al reciclaje, a la reutilización de materiales i a otras formas de reciclaje de aparatos usados, usted contribuirá de forma importante a la protección de nuestro medio ambiente.

(F) Remarques concernant la protection de l'environnement :



Conformément à la directive européenne 2002/96/CE, et afin d'atteindre un certain nombre d'objectifs en matière de protection de l'environnement, les règles suivantes doivent être appliquées.

Elles concernent les déchets d'équipement électriques et électroniques. Le pictogramme "picto" présent sur le produit, son manuel d'utilisation ou son emballage indique que le produit est soumis à cette réglementation. Le consommateur doit retourner le produit usager aux points de collecte prévus à cet effet. Il peut aussi le remettre à un revendeur. En permettant enfin le recyclage des produits, le consommateur contribuera à la protection de notre environnement. C'est un acte écologique.

(D) Hinweis zum Umweltschutz:



Ab dem Zeitpunkt der Umsetzung der europäischen Richtlinie 2002/96/EU in nationales Recht gilt folgendes:

Elektrische und elektronische Geräte dürfen nicht mit dem Hausmüll entsorgt werden. Der Verbraucher ist gesetzlich verpflichtet, elektrische und elektronische Geräte am Ende ihrer Lebensdauer an den dafür eingerichteten, öffentlichen Sammelstellen oder an die Verkaufsstelle zurückzugeben. Einzelheiten dazu regelt das jeweilige Landesrecht. Das Symbol auf dem Produkt, der Gebrauchsanleitung oder der Verpackung weist auf diese Bestimmungen hin. Mit der Wiederverwertung, der stofflichen Verwertung oder anderer Formen der Verwertung von Altgeräten leisten Sie einen wichtigen Beitrag zum Schutz unserer Umwelt.

(I) Informazioni per protezione ambientale:



Dopo l'implementazione della Direttiva Europea 2002/96/EU nel sistema legale nazionale, ci sono le seguenti applicazioni:

I dispositivi elettrici ed elettronici non devono essere considerati rifiuti domestici. I consumatori sono obbligati dalla legge a restituire i dispositivi elettrici ed elettronici alla fine della loro vita utile ai punti di raccolta collerici preposti per questo scopo o nei punti vendita. Dettagli di quanto riportato sono definiti dalle leggi nazionali di ogni stato. Questo simbolo sul prodotto, sul manuale d'istruzioni o sull'imballo indicano che questo prodotto è soggetto a queste regole. Dal riciclo, e re-utilizzo del material o altre forme di utilizzo di dispositivi obsoleti, voi renderete un importante contributo alla protezione dell'ambiente.

(P) Nota em Protecção Ambiental:



Após a implementação da directiva comunitária 2002/96/EU no sistema legal nacional, o seguinte aplica-se:

Todos os aparelhos eléctricos e electrónicos não podem ser despejados juntamente com o lixo doméstico. Consumidores estão obrigados por lei a colocar os aparelhos eléctricos e electrónicos sem uso em locais públicos específicos para este efeito ou no ponto de venda. Os detalhes para este processo são definidos por lei pelos respectivos países. Este símbolo no produto, o manual de instruções ou a embalagem indicam que o produto está sujeito a estes regulamentos. Reciclando, reutilizando os materiais dos seus velhos aparelhos, esta a fazer uma enorme contribuição para a protecção do ambiente.